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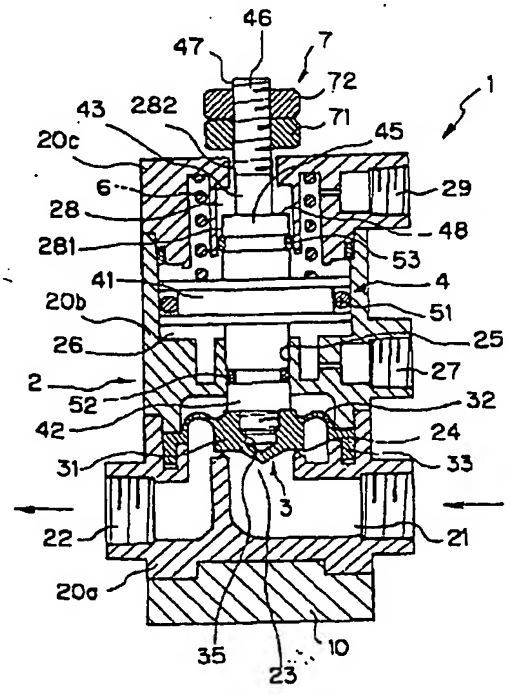
(54)【考案の名称】　方向制御弁

(57)【要約】

【目的】　構造が簡単でコンパクトにでき、弁体の動作状態を外部から目視でき、或いは弁体の動作状態を電気的に検出する構造に簡単に変更できる安価な方向制御弁を提供する。

【構成】　方向制御弁は、複数のポート（２１、２２）及び該ポート間を連通する弁口（２３）を有する弁本体（２）と、弁本体内に弁口（２３）を開閉可能に配置された弁体（３）と、該弁体と連結されかつ弁本体に設けられたシリンダ内に移動可能に配置されたピストン（４１）とを備え、該ピストンを動作させることによって弁体を動作させるようになっている。ピストン（４１）には弁体（３）と反対の方向に向かって軸方向に伸びるロッド（４３）が取り付けてられている。ロッド（４３）は弁本体（２）のカバー部分（２０ｃ）に形成された穴を通して弁本体の外部に突出される。ロッド（４３）にはカバー部分と当接して弁体の閉弁方向への移動を制限する絞り調整部材が位置調整可能に取り付けられている。



【実用新案登録請求の範囲】

【請求項１】　複数のポート及び該ポート間を連通する弁口を有する弁本体と、該弁本体内に該弁口を開閉可能に配置された弁体と、該弁体と連結されかつ該弁本体に設けられたシリンダ内に移動可能に配置されたピストンとを備え、該ピストンを動作させることによって該弁体を動作させる方向制御弁において、該ピストンには該弁体と反対の方向に向かって軸方向に伸びるロッドを取り付けて該ロッドを該弁本体のカバー部分に形成された穴を通して該弁本体の外部に突出させ、該ロッドには該カバー部分と当接して該弁体の閉弁方向への移動を制限する絞り調整部材を位置調整可能に取り付けたことを特徴とする方向制御弁。

【請求項２】　複数のポート及び該ポート間を連通する弁口を有する弁本体と、該弁本体内に該弁口を開閉可能に配置された弁体と、該弁体と連結されかつ該弁本体に設けられたシリンダ内に移動可能に配置されたピストンとを備え、該ピストンを動作させることによって該弁体を動作させる方向制御弁において、該ピストンには該弁体と反対の方向に向かって軸方向に伸びるロッドを取り付けて該ロッドを該弁本体のカバー部分に形成された穴を通して該弁本体の外部に突出させ、該カバー部分の該穴には該ロッドと当接して開弁方向の弁体の移動を制限する中空の流量調整部材を該弁本体に関して位置調整可能に取り付け、該ロッドを該第２の調整部材内に貫通させたことを特徴とする方向制御弁。

【請求項３】　請求項２に記載の方向制御弁において、該ロッドには流量調整部材と当接して該弁体の閉弁方向への移動を制限する絞り調整ねじを位置調整可能に取り付けたことを特徴とする方向制御弁。

【図面の簡単な説明】

【図１】本考案の方向制御弁の一実施例の断面図である。

【図２】本考案の方向制御弁の他の実施例の断面図である。

【図３】本考案の方向制御弁の別の実施例の断面図である。

【図４】方向制御弁の変形例の断面図である。

【図５】従来の方向制御弁の一例の断面図である。

【図６】従来の方向制御弁の一例の断面図である。

【符号の説明】

１、１'、１"　方向制御弁

２　弁本体

２０a、２０b、２０c　部分　　２１、２２　ポート

２３　弁口　　２４　弁座

２６　シリンダ穴　　２８　貫通穴

３　弁体

３１　弁部　　３２　ダイヤフラム

４　駆動装置

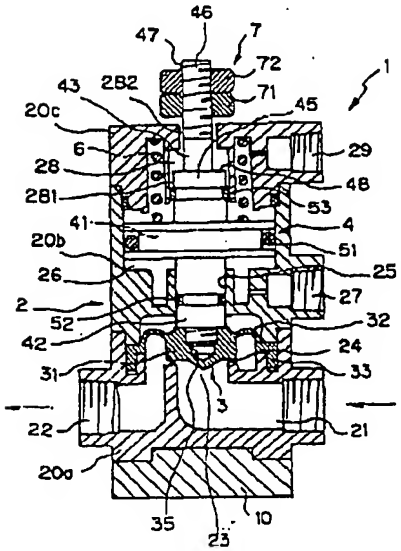
４１　ピストン　　４２　弁棒

４３　ロッド

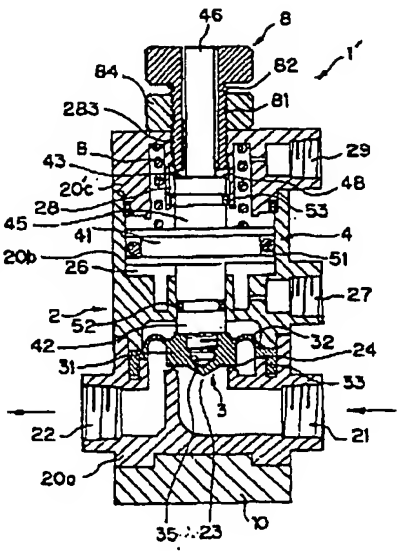
７　絞り調整部材

８　流量調整部材

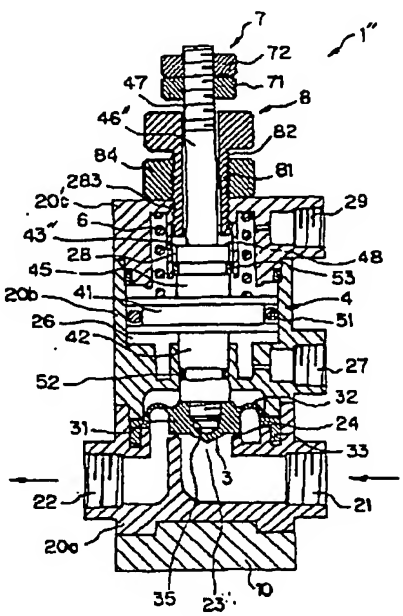
【図１】



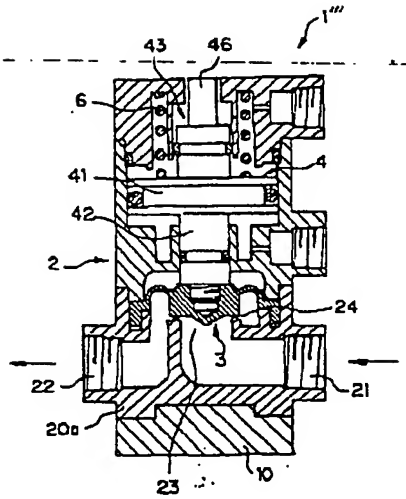
【図２】



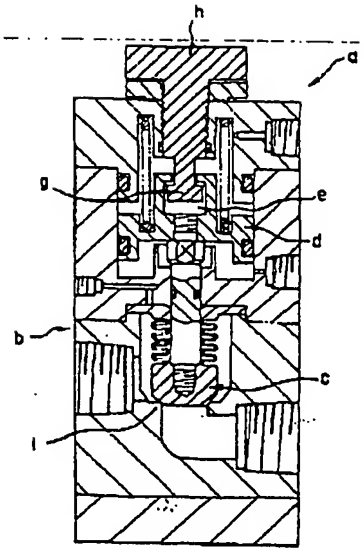
【図３】



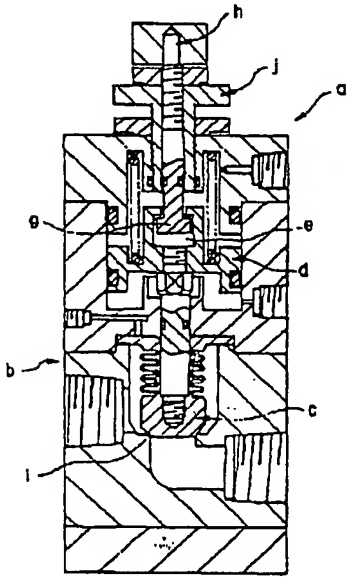
【図４】



【図５】



【図６】



【考案の詳細な説明】

【０００１】

【産業上の利用分野】

本考案は方向制御弁に関し、更に詳細には、閉弁時の滞留防止流を許容する機能及び開弁時の流量調整機能の少なくとも一つを有する方向制御弁に関する。

【０００２】

【従来の技術】

閉じ位置にあるときでも弁体が弁座から僅かに離れていて流路内に少しの流れを許容する形式の方向制御弁の従来のものとしては、例えば実開平３－２５０８７号公報に示されているものがある。この公報に示された従来の一つの方向制御弁は、図５に示されるように、方向制御弁ａの弁本体ｂ内に配置された弁体ｃと連結されたピストンｄに係合孔ｅを形成し、その係合孔ｅ内に入るストッパｇが先端に一体的に形成された絞り調整ねじｈを弁本体ｂの上部に位置可変に取り付けてストッパにより弁体の移動を制限できるようにし、その絞り調整ねじｈの位置を調節することによってストッパの位置を調節し、それによって閉弁時においても弁体が弁座ｉと接触せずにそれらの間に僅かな隙間を形成して流体の流れを許容するようにしている。また、同公報に記載された他の方向制御弁は、図６に示されるように、絞り調整ねじｈの外側に中空円筒状の別の絞り流量調整ねじｊを配設してその流量調整ねじｊを弁本体ｃに関して位置調整可能にしかつ絞り調整ねじｈを流量調整ねじｊに関して位置調整可能にし、開弁時にピストンｄを流量調整ねじｊの内端に当接させて開弁時の開度を調整するようになっている。

【０００３】

しかしながら、上記のような従来の方向制御弁では、いずれの場合も弁体の動作状態を外部から目視できない欠点がある。このような制御弁で弁体の動作状態を外部から観察できるようにしようとすれば、ピストンに磁石を埋め込むとともに弁本体にピストンに隣接して磁気検出器を設けなければならず、制御弁が高価になる欠点もある。また、ピストン及び絞り調整ねじの形状、構造が複雑になるので、制御弁の加工費が高価になる欠点もある。

【０００４】

【考案が解決しようとする課題】

本考案が解決しようとする課題は、構造が簡単でコンパクトにでき、弁体の動作状態を外部から目視でき、或いは弁体の動作状態を電気的に検出する構造に簡単に変更できる安価な方向制御弁を提供することである。

【０００５】

【課題を解決するための手段】

本願の一つの考案は、複数のポート及び該ポート間を連通する弁口を有する弁本体と、該弁本体内に該弁口を開閉可能に配置された弁体と、該弁体と連結されかつ該弁本体に設けられたシリンダ内に移動可能に配置されたピストンとを備え、該ピストンを動作させることによって該弁体を動作させる方向制御弁において、該ピストンには該弁体と反対の方向に向かって軸方向に伸びるロッドを取り付けて該ロッドを該弁本体のカバー部分に形成された穴を通して該弁本体の外部に突出させ、該ロッドには該カバー部分と当接して該弁体の閉弁方向への移動を制限する絞り調整部材を位置調整可能に取り付けて構成されている。

本願の他の考案は、複数のポート及び該ポート間を連通する弁口を有する弁本体と、該弁本体内に該弁口を開閉可能に配置された弁体と、該弁体と連結されかつ該弁本体に設けられたシリンダ内に移動可能に配置されたピストンとを備え、該ピストンを動作させることによって該弁体を動作させる方向制御弁において、該ピストンには該弁体と反対の方向に向かって軸方向に伸びるロッドを取り付けて該ロッドを該弁本体のカバー部分に形成された穴を通して該弁本体の外部に突出させ、該カバー部分の該穴には該ロッドと当接して開弁方向の弁体の移動を制限する中空の流量調整部材を該弁本体に関して位置調整可能に取り付け、該ロッドを該第２の調整部材内に貫通させて構成されている。

なお、該ロッドには流量調整部材と当接して該弁体の閉弁方向への移動を制限する絞り調整ねじを位置調整可能に取り付けてもよい。

【０００６】

【作用】

上記構成において、ピストンの弁体側の面に流体圧が作用しないとき、ピストンはばねの作用により又はピストンの反対側に作用する流体圧により弁体側に押

されて弁体は閉弁状態に押圧される。このときピストンに取り付けられたロッドに取り付けられた絞り調整部材が弁本体に当たるか又は弁本体に取り付けられた流量調整部材に当たると、弁体は閉弁方向への移動が制限され、弁体と弁座との間に隙間ができてポート間でわずかに流体が流れる。一方、ピストンの弁体側の面に流体が作用すると、ピストン及び弁体は弁座から離れる方向すなわち開弁方向に移動し、方向制御弁は開弁状態になる。この場合弁本体に流量調整部材が取り付けられていればロッドがその流量調整部材に当接して弁体の開度が制限され、開弁時の流量が調整される。

【０００７】

【実施例】

以下、図面を参照し一部分の該穴には該御弁の実施例について説明する。

図１において、第１量調整部材を該弁本制御弁１が示されている。同図において、方向制御弁１は、整部材内に貫通させ 分２０b及び上部分すなわちカバー部分２０cとを有する弁本体２と、該弁本体２内に配設された弁体３と、弁体３を駆動する駆動装置４とを備えている。上記弁本体２０a、２０b、２０cは公知の方法でベース１０に固定されている。弁本体２の下部分２０aには入口ポート２１、出口ポート２２、入口ポートと出口ポートとを接続する弁口２３及び弁口の上端（図１において）を囲む弁座２４が形成されている。弁本体２の中央部分２０bは下部分２０aの上に嵌合固定されていて、貫通穴２５と、シリンダ穴２６と、シリンダ穴に通じる給排ポート２７とが形成されている。弁本体２のカバー部分２cには貫通穴２８と給排ポート２９とが形成されている。貫通穴２８は内側の大径部分２８１と外側の小径部分２８２とで構成されている。上記弁本体２の各部分２０a、２０b、２０cは、好ましくは耐腐食性の樹脂材料、例えばテフロン（商標名）によって形成される。

【０００８】

弁体３は、弁本体に形成された弁座２４と係合するようになっている弁部３１と、弁部３１の外周にその弁部３１と一体に形成された薄いダイヤフラム部分３２と、そのダイヤフラム部分３２の外周に形成された固定部３３とを有していて、それらは耐腐食性で柔軟性のある樹脂材料で一体的に形成されている。固定部

３３は弁本体の下部分２０aと中央部分２０bとの間に挟まれて固定され、下部分の各ポート２１、２２及び弁口２３内にある流体が中央部分２０b内に流入しないようになっている。

【０００９】

駆動装置４は、この実施例では、弁本体２の中央部分２０bのシリンダ穴２６内に移動可能に装着されたピストン４１を備え、そのピストンの一方の側（図１で下側）には中央部分２０bの貫通穴２５内を貫通しかつ弁体３の弁部３１の上側に固定された弁棒４２が一体的に形成されている。弁棒の先端（図１で下端）は弁体３の弁部３１の上面に形成されたねじ穴３５に螺合され、それによって弁体に固定されている。ピストン４１の他方の側には上部分すなわちカバー部分２０cの貫通穴２８を通してカバー部分の外部まで伸びるロッド４３が一体的に形成されている。ロッド４３には貫通穴２８の大径部分２８１に入る大径部分４５と、貫通穴２８の小径部分２８２に入る小径部分４６とが形成されている。ピストン４１の外周、弁棒４２の外周及びロッド４３の外周にＯリングシール５１、５２及び５３がそれぞれ配設され、ピストンとシリンダ穴との間、弁棒と貫通穴との間及びロッドと貫通穴との間の流体の漏れを防止する。ピストン４１とカバー部分２０cとの間にはばね６が配設され、ピストンを常時弁体３側に弾圧している。

【００１０】

ロッド４３の小径部分４６の先端（図１において上端）側の外周には雄ねじ４７が形成され、その雄ねじには絞り調整部材７が螺合されている。この絞り調整部材は一対のナット７１及び７２で構成されていて、公知の方法でロッド４３に関して位置調整可能に移動できると共にロッドに固定できるようになっている。

【００１１】

上記構成の方向制御弁１において、給排ポート２７に流体圧が供給されていないとき、ピストン４１はばね６の作用により下方すなわち弁体３側に弾圧されている。この場合絞り調整部材すなわちナット７１及び７２を回してロッド４３に関して移動させ、弁体３の弁部３１の下面が弁座２４に当接する前にナット７１の下面がカバー部分２０cの上面に当接するようにすれば、閉弁時でも弁体３と

弁座２４との間に僅かな隙間が形成されて、入口ポート２１かた出口ポート２２に僅かに流体（滞留防止流）が流れることができる。そして閉弁時の流体の流れる流量はロッドに関して絞り調整部材７のナット７１及び７２の位置を変えることによって変更できる。なおピストン４１及び弁体３を閉弁位置に偏倚するのにばね６の押圧力だけでなく給排ポート２９を介してピストンの上側に流体圧を作用させてもよい。

【００１２】

一方、給排ポート２７を介してピストン４１の下側に所定圧力（ばねに抗してピストンを押し上げる最低圧力）以上の流体圧を作用させると、ピストン４１及びそのピストンに連結された弁体３がばね６の押圧力に抗して上方に移動し、方向制御弁は開弁状態になる。この場合、ピストンの動作と連動してロッド４３が動き、そのロッドが弁本体の外側に突出しているので、ピストン、したがって弁体の動作を外部から目視できる。

【００１３】

図２において、本考案の方向制御弁の他の実施例１'が示されている。なお、この実施例において、図１の実施例と共通の部品については同じ参照番号を付して説明は省略する。

方向制御弁１'が方向制御弁１と異なる点は以下の通りである。すなわち、弁本体２のカバー部分２０c'形成された貫通穴２８'の径が貫通穴２８に比較して大きくなっていて内周に雌ねじ２８３が形成されている。そしてその貫通穴２８'内には、流量調整部材８の外周に雄ねじ８２が形成された中空管状の部分８１が螺合されている。この流量調整部材８は雄ねじ８３及びそれに螺合された固定ナット８４により公知の方法でカバー部材２０cに関して任意の位置に調整できるようになっている。ロッド４３の小径部分４６は流量調整部分８内に通されている。この流量調整部材８の内側端（図２で下端）はピストン４１と一体に形成されたロッド４３の肩部４８に当接してピストンの上方向への移動を制限できるようになっている。

【００１４】

上記実施例の方向制御弁１'において、給排ポート２７に流体圧が供給されて

いないとき、ピストン４１はばね６の押圧力により、或いはそのばねの押圧力と供給ポート２９からピストン４１の上側に供給された流体の力により、下方すなわち弁体３側に弾圧され、弁体３の弁部３１の下面が弁座２４に当接して停止している。したがって弁口２３は弁体３によって閉ざされて方向制御弁は閉弁状態にある。この実施例では、閉弁状態において弁体と弁座との間に隙間が形成されないので、流体を入口ポートから出口ポートに僅かに流すという機能は有しない。

【００１５】

一方、給排ポート２７を介してピストン４１の下側に所定圧力の流体圧を作用させると、ピストン４１及びそのピストンに連結された弁体３がばね６の押圧力に抗して上方に移動し、方向制御弁は開弁状態になる。この場合、ピストン４１及びロッド４３が所定距離移動すると、ロッド４３の肩部４８が流量調整部材８の下端に当たってピストン及びロッドの上方向の移動を、これによって弁体３の上方向の移動を制限する。したがって、カバー部分２０c'に関して流量調整部材８の位置を調節することによってピストンの最大上昇位置、したがって弁座２４からの弁体３の距離を調節でき、方向制御弁の開弁時の流量を調整できる。また、ピストンの動作と連動してロッド４３が動き、そのロッドが弁本体の外側に突出しているので、ピストン、したがって弁体の動作を外部から目視できる。

【００１６】

図３において、本考案の方向制御弁の他の実施例１″が示されている。なお、この実施例において、図２の実施例と共通の部品については同じ参照番号を付して説明は省略する。

方向制御弁１″が方向制御弁１'と異なる点は以下の通りである。すなわち、流量調整部材８内に通されているロッド４３″の小径部分４６″が図２に示される方向制御弁の小径部分４６よりかなり長くなっていて、その上端が流量調整部分８の上端を越えて外部に突出し、その突出した部分に形成された雄ねじ４７には図１の場合と同様の絞り調整部材７を構成する一対のナット７１及び７２が螺合されている。

【００１７】

上記構成の方向制御弁１″において、給排ポート２７に流体圧が供給されていないとき、ピストン４１はばね６の押圧力により、或いはそのばねの押圧力及び給排ポート２９を介してピストン４１の上側に供給された流体の力により下方すなわち弁体側に弾圧されている。この場合絞り調整部材すなわちナット７１及び７２を回してロッド４３″に関して移動させ、弁体３の弁部３１の下面が弁座２４に当接する前にナット７１の下面が流量調整部材８の上面に当接するようにすれば、閉弁時でも弁体３と弁座２４との間に僅かな隙間が形成されて、入口ポート２１から出口ポート２２に僅かに流体（滞留防止流）が流れることができる。そして閉弁時の流体の流れる流量はロッドに関して絞り調整部材７のナット７１及び７２の位置を変えることによって変更できる。

【００１８】

一方、給排ポート２７を介してピストン４１の下側に所定圧力の流体圧を作用させると、ピストン４１及びそのピストンに連結された弁体３がばね６の押圧力に抗して上方に移動し、方向制御弁は開弁状態になる。この場合、ピストン４１及びロッド４３が所定距離移動すると、ロッド４３の肩部４８が流量調整部材８の下端に当たってピストン及びロッドの上方向の移動を、これによって弁体３の上方向の移動を制限する。したがって、カバー部分２０c'に関して流量調整部材８の位置を調節することによってピストンの最大上昇位置、したがって弁座２４からの弁体３の距離を調節でき、方向制御弁の開弁時の流量を調整できる。

【００１９】

本考案によれば、ピストン４１及びそれと一体のロッド４３を図３に示されような構造（ロッドの小径部分が最も長い構造）にかつ弁本体２の上部分すなわちカバー部分２０cを図１に示されるような構造に、予め製造しておけば、それらの部品に僅かな加工を施すだけで上記三つの実施例に、更には図４に示される構造の方向制御弁に変更できる。すなわち、まず、図３に示されたピストン及びロッドの構造のロッドを短く切って図１に示された弁本体及び弁体と共に使用すれば図１の実施例の方向制御弁をつくることができる。図１に示される構造のカバー部分２０cの貫通穴２８の小径部分２８１の内周に雌ねじを形成してそこに流量調整部材８を螺合し、図３に示されるピストン及びロッドの構造のうちロッド

の小径部分４６の先端部（図３で流量調整部材より上に突出した部分）を切り取れば、図２の実施例の方向制御弁をつくることができる。また、上記において、ロッド４３を図３に示されるよう長いまま使用すれば、図３の実施例の方向制御弁をつくることができる。更にロッドを図１に示されるものより更に短く切断して使用すれば、図４に示されるように閉弁時の絞り調整機能もまた開弁時の流量調整機能も有しない単なる方向制御弁１''につくることができる。

【００２０】

なお、上記実施例においては、ピストンと、弁棒と、ロッドとを一体に形成した構造になっているが、それらを別個に製造して互いに固定してもよい。

【００２１】

【考案の効果】

本考案によれば、以下のような効果を奏することが可能である。

（イ）弁の動作状態を外部から目視できる方向制御弁を製造できる。

（ロ）弁の動作状態を電気信号に返還して表示するときでもマイクロスイッチ等を弁本体の外部に取り付けるだけで済むので、簡単かつ安価に変更できる。

（ハ）構造が簡単で、コンパクトな方向制御弁を製造できる。

（ニ）部品の一部を加工するだけで、閉弁時の絞り機能を有する方向制御弁、開弁時の流量調整機能を有する方向制御弁、両機能を有する方向制御弁或いは両機能を全く有しない方向制御弁を製造でき、製造コストの低減を図ることができる。

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Utility model registration claim]
[Claim 1] The valve body which has the valve port which opens between two or more ports and this port for free passage, and the valve element arranged possible [closing motion of this valve port] in this valve body, In the directional control valve which operates this valve element by having the piston arranged movable in the cylinder which was connected with this valve element and prepared in this valve body, and operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. The directional control valve characterized by attaching possible [justification of the diaphragm controller material which restricts migration in the direction of clausilium of this valve element to this rod in contact with this covering part].
[Claim 2] The valve body which has the valve port which opens between two or more ports and this port for free passage, and the valve element arranged possible [closing motion of this valve port] in this valve body, In the directional control valve which operates this valve element by having the piston arranged movable in the cylinder which was connected with this valve element and prepared in this valve body, and operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. the flow control member of the hollow which restricts migration of the valve element of the valve-opening direction to this hole of this covering part in contact with this rod -- this valve body -- being related -- justification -- possible -- attaching -- this rod -- this -- the directional control valve characterized by making it penetrate in the 2nd controller material.
[Claim 3] The directional control valve characterized by attaching possible [justification of the diaphragm adjusting screw which restricts migration in the direction of clausilium of this valve element to this rod in contact with a flow control member] in a directional control valve according to claim 2.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed explanation of a design]
[0001]
[Industrial Application]
This design is further related with the directional control valve which has at least one of the function to permit the stagnation prevention style at the time of clausilium in a detail, and the flow adjustability at the time of valve opening about a directional control valve.
[0002]
[Description of the Prior Art]
Even when it is in a closing location, there are some the valve element is indicated to be, for example to JP,3-25087,U as a conventional thing of the directional control valve of a format which is slightly separated from the valve seat and permits slight flow in passage. One conventional directional control valve shown in this official report As shown in drawing 5 , the engagement hole e is formed in the piston d connected with the valve element c arranged in the valve body b of a directional control valve a. Attach strangely good [a location] in the upper part of the valve body b diaphragm adjusting-screw h by which the stopper g which enters in the engagement hole e was formed at the tip in one, and it enables it for a stopper to restrict migration of a valve element. The location of a stopper is adjusted, and he forms few clearances among them, without a valve element contacting a valve seat i by it at the time of clausilium, and is trying to permit the flow of a fluid by adjusting the location of the drawing adjusting-screw h. Moreover, other directional control valves indicated by this official report As shown in drawing 6 , arrange bell shape another drawing flow control **** j on the outside of diaphragm adjusting-screw h, and enable justification of the flow control **** j about the valve body c, and justification of diaphragm adjusting-screw h is enabled about the flow control **** j. At the time of valve opening, Piston d is made to contact the inner edge of the flow control **** j, and the opening at the time of valve opening is adjusted.
[0003]
However, in any case, in the above conventional directional control valves, there is a fault which cannot view the operating state of a valve element from the outside. If it is going to enable it to observe the operating state of a valve element from the outside by such control valve, while embedding a magnet at a piston, a piston must be adjoined, and a field indicator must be formed in a valve body, and it also has the fault to which a control valve becomes expensive. Moreover, since the configuration of a piston and a diaphragm adjusting screw and structure become complicated, the fault which becomes expensive also has the conversion cost of a control valve.
[0004]
[Problem(s) to be Solved by the Device]
The technical problem which this design tends to solve is offering the cheap directional control valve which can be changed easily [structure is easy and / the structure of it being made to a

compact, and being able to view the operating state of a valve element from the outside, or detecting the operating state of a valve element electrically].
[0005]
[Means for Solving the Problem]
The valve body which has the valve port to which one design of this application opens between two or more ports and this port for free passage, It has the piston arranged movable in the cylinder which was connected with the valve element arranged possible [closing motion of this valve port] in this valve body, and this valve element, and was prepared in this valve body. In the directional control valve which operates this valve element by operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. It attaches in this rod possible [justification of the diaphragm controller material which restricts migration in the direction of clausilium of this valve element in contact with this covering part], and is constituted.
The valve body which has the valve port to which other designs of this application open between two or more ports and this port for free passage, It has the piston arranged movable in the cylinder which was connected with the valve element arranged possible [closing motion of this valve port] in this valve body, and this valve element, and was prepared in this valve body. In the directional control valve which operates this valve element by operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. the flow control member of the hollow which restricts migration of the valve element of the valve-opening direction to this hole of this covering part in contact with this rod -- this valve body -- being related -- justification -- possible -- attaching -- this rod -- this -- it is made to penetrate in the 2nd controller material, and is constituted.
In addition, you may attach in this rod possible [justification of the diaphragm adjusting screw which restricts migration in the direction of clausilium of this valve element in contact with a flow control member].
[0006] [Function] the time of hydrostatic pressure not acting on the field by the side of the valve element of a piston in the above-mentioned configuration -- a piston -- an operation of a spring -- or it is pushed on a valve element side by the hydrostatic pressure which acts on the opposite side of a piston, and a valve element is pressed by the clausilium condition. In the flow control member which was attached in the rod attached in the piston at this time and which it extracted, and controller material hit the valve body, or was attached in the valve body, migration in the direction of clausilium is restricted, a valve element is made by the clearance between a valve element and a valve seat, and a fluid flows slightly between ports. On the other hand, if a fluid acts on the field by the side of the valve element of a piston, a piston and a valve element move in the direction, i.e., valve-opening direction, which separates from a valve seat, and a directional control valve will be in a valve-opening condition. In this case, if the flow control member is attached in the valve body, in contact with that flow control member, the opening of a valve element will be restricted for a rod, and the flow rate at the time of valve opening will be adjusted.
[0007] [Example] Hereafter, the example of this valve is explained to this hole of - part with reference to a drawing.
In drawing 1 , this **** control valve 1 is shown in the 1st amount controller material. A directional control valve 1 is made to penetrate in a ready member in this drawing. It has the valve body 2 which part 20b Reaches and has a part for the upper part, i.e., covering partial 20c, the valve element 3 arranged in this valve body 2, and the driving gear 4 which drives a valve element 3. The above-mentioned valve bodies 20a, 20b, and 20c are being fixed to the

base 10 by the well-known approach. The valve seat 24 surrounding the upper limit (setting to drawing 1) of the valve port 23 which connects the inlet-port port 21, an exit port 22, an inlet-port port, and an exit port, and a valve port is formed in lower part 20a of the valve body 2. Fitting immobilization of the central partial 20b of the valve body 2 is carried out on lower part 20a, and the through hole 25, the cylinder hole 26, and the feeding-and-discarding port 27 that leads to a cylinder hole are formed. The through hole 28 and the feeding-and-discarding port 29 are formed in covering partial 2c of the valve body 2. The through hole 28 consists of parts for a part for the inside major diameter 281, and the outside narrow diameter portion 282. Each parts 20a, 20b, and 20c of the above-mentioned valve body 2 are preferably formed by the resin ingredient of corrosion resistance, for example, Teflon, (brand name).

[0008]

The valve element 3 has the fixed part 33 formed in the periphery of the valve portion 31 which engages with the valve seat 24 formed in the valve body, and a valve portion 31 at the periphery of the valve portion 31, the thin diaphram part 32 formed at one, and its diaphram part 32, and they are formed in one with the resin ingredient which is supple with corrosion resistance. A fixed part 33 is pinched and fixed between lower part 20a of a valve body, and central partial 20b, and the fluid in each ports 21 and 22 for the lower part and a valve port 23 flows in central partial 20b.

[0009]

The valve rod 42 which the driving gear 4 was equipped with the piston 41 with which it was equipped movable in this example in the cylinder hole 26 of central partial 20b of the valve body 2, and penetrated the inside of the through hole 25 of central partial 20b to one of that piston side (it is the bottom at drawing 1), and was fixed to the valve portion 31 bottom of a valve element 3 is formed in one. The tip of a valve rod (being drawing 1 lower limit)
It is screwed in the tapped hole 35 formed in the top face of the valve portion 31 of ****** 3, and is being fixed to the valve element by it. The rod 43 extended to the exterior of a covering part through the through hole 28 for the upper part (i.e., covering partial 20c) is formed in the another side side of a piston 41 in one. A part for a part for the major diameter 45 included in a part for the major diameter 281 of a through hole 28 and the narrow diameter portion 46 included in a part for the narrow diameter portion 282 of a through hole 28 is formed in the rod 43. The O ring seals 51, 52, and 53 are arranged in the periphery of a piston 41, the periphery of a valve rod 42, and the periphery of a rod 43, respectively, and the leakage of the fluid between a valve rod and a through hole and between a rod and a through hole is prevented between a piston and a cylinder hole. A spring 6 is arranged between a piston 41 and covering partial 20c, and the piston is always oppressed to the valve element 3 side.

[0010]

A male screw 47 is formed in the periphery by the side of the tip for the narrow diameter portion 46 of a rod 43 (it sets to drawing 1 and is upper limit), it extracts to the male screw, and the controller material 7 is screwed. This drawing controller material consists of nuts 71 and 72 of a pair, and it can be fixed to a rod while it is movable possible [justification] about a rod 43 by the well-known approach.

[0011]

In the directional control valve 1 of the above-mentioned configuration, when hydrostatic pressure is not supplied to the feeding-and-discarding port 27, the piston 41 is oppressed according to an operation of a spring 6 at the lower part 3, i.e., valve element, side. In this case, if it is made for the inferior surface of tongue of a nut 71 to contact the top face of covering partial 20c before turning the diaphragm controller material 71 and 72, i.e., nuts, making it move about a rod 43 and the inferior surface of tongue of the valve portion 31 of a valve element 3 contacting a valve seat 24, also in the time of clausilium, few clearances are formed between a valve element 3 and a valve seat 24, and a fluid (stagnation prevention

style) can flow slightly to the method exit port 22 of inlet-port port 21. And the flow rate to which the fluid at the time of clausilium flows can be changed by extracting about a rod and changing the location of the nuts 71 and 72 of the controller material 7. In addition, hydrostatic pressure may be made to act on deflecting a piston 41 and a valve element 3 in a clausilium location at the piston bottom not only through the thrust of a spring 6 but through the feeding-and-discarding port 29.

[0012]

On the other hand, if the hydrostatic pressure more than a predetermined pressure (the minimum pressure which resists a spring and pushes up a piston) is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a directional control valve will be in a valve-opening condition. In this case, since actuation of a piston was interlocked with, the rod 43 moved and that rod has projected on the outside of a valve body, actuation of a piston, therefore a valve element can be viewed from the outside.

[0013]

In drawing 2 , other example 1' of the directional control valve of this design is shown. In addition, in this example, the reference number same about the example of drawing 1 and common components is attached, and explanation is omitted.

The point that directional-control-valve 1' differs from a directional control valve 1 is as follows. That is, the path of through hole 28' by which covering partial 20c' formation of the valve body 2 was done is large as compared with the through hole 28, and the female screw 283 is formed in inner circumference. And in the through hole 28', the part 81 of the shape of hollow tubing by which the male screw 82 was formed in the periphery of the flow control member 8 is screwed. The lock nut 84 screwed in a male screw 83 and it can adjust now this flow control member 8 in the location of arbitration about covering member 20c by the well-known approach. It lets a part for the narrow diameter portion 46 of a rod 43 pass in the flow control part 8. The inside edge (it is a lower limit at drawing 2) of this flow control member 8 can restrict migration to above [of a piston] now in contact with a piston 41 and the shoulder 48 of the rod 43 formed in one.

[0014]

the time of hydrostatic pressure not being supplied to the feeding-and-discarding port 27 in directional-control-valve 1' of the above-mentioned example -- a piston 41 -- the thrust of a spring 6.-- or it was oppressed at the lower part 3, i.e., valve element, side according to the thrust of the spring, and the force of the fluid supplied to the piston 41 bottom from the supply port 29, and the inferior surface of tongue of the valve portion 31 of a valve element 3 has stopped in contact with a valve seat 24. Therefore, a valve port 23 is shut by the valve element 3, and a directional control valve is in a clausilium condition. In this example, since a clearance is not formed between a valve element and a valve seat in a clausilium condition, it does not have the function to pour a fluid from an inlet-port port slightly to an exit port.

[0015]

On the other hand, if the hydrostatic pressure of a predetermined pressure is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a directional control valve will be in a valve-opening condition. In this case, if a piston 41 and a rod 43 carry out predetermined distance migration, the shoulder 48 of a rod 43 will restrict above migration of a valve element 3 for above migration of a piston and a rod by this in the lower limit of the flow control member 8. Therefore, by adjusting the location of the flow control member 8 about covering partial 20c', the maximum climb location of a piston, therefore the distance of the valve element 3 from a valve seat 24 can be adjusted, and the flow rate at the time of valve opening of a directional control valve can be adjusted. Moreover, since actuation

of a piston was interlocked with, the rod 43 moved and the rod has projected on the outside of a valve body, actuation of a piston, therefore a valve element can be viewed from the outside.
[0016]
In drawing 3 , other example 1" of the directional control valve of this design is shown. In addition, in this example, the reference number same about the example of drawing 2 and common components is attached, and explanation is omitted.
The point that directional-control-valve 1" differs from directional-control-valve 1' is as follows. Namely, narrow diameter portion part 46of rod 43" which it lets pass in flow control member 8" is quite longer than a part for the narrow diameter portion 46 of the directional control valve shown in drawing 2 . The nuts 71 and 72 of the pair which constitutes the same drawing controller material 7 as the case of drawing 1 are screwed in the male screw 47 with which the upper limit was formed outside at a projection and its projected part exceeding the upper limit of the flow control part 8.
[0017]
the time of hydrostatic pressure not being supplied to the feeding-and-discarding port 27 in directional-control-valve 1" of the above-mentioned configuration -- a piston 41 -- the thrust of a spring 6 -- or it is oppressed at the lower part, i.e., valve element, side according to the force of the fluid supplied to the piston 41 bottom through the thrust and the feeding-and-discarding port 29 of the spring. In this case, if it is made for the inferior surface of tongue of a nut 71 to contact the top face of the flow control member 8 before turning the diaphragm controller material 71 and 72, i.e., nuts, making it move about rod 43" and the inferior surface of tongue of the valve portion 31 of a valve element 3 contacting a valve seat 24 Also in the time of clausilium, few clearances are formed between a valve element 3 and a valve seat 24, and a fluid (stagnation prevention style) can flow slightly to the method exit port 22 of inlet-port port 21.
And the flow rate to which the fluid at the time of clausilium flows can be changed by extracting about a rod and changing the location of the nuts 71 and 72 of the controller material 7.
[0018]
On the other hand, if the hydrostatic pressure of a predetermined pressure is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a directional control valve will be in a valve-opening condition. In this case, if a piston 41 and a rod 43 carry out predetermined distance migration, the shoulder 48 of a rod 43 will restrict above migration of a valve element 3 for above migration of a piston and a rod by this in the lower limit of the flow control member 8. Therefore, by adjusting the location of the flow control member 8 about covering partial 20c', the maximum climb location of a piston, therefore the distance of the valve element 3 from a valve seat 24 can be adjusted, and the flow rate at the time of valve opening of a directional control valve can be adjusted.
[0019]
according to this design, a piston 41 and the rod 43 of it and one are shown in drawing 3 -- having -- structure [like] (structure where the amount of [of a rod] narrow diameter portion is the longest) -- and if it manufactures beforehand in structure as shown in drawing 1 , a part for the upper part, i.e., covering partial 20c, of the valve body 2, it can change into the three above-mentioned examples only by performing slight processing to those components at the directional control valve of the structure shown further at drawing 4 . That is, if it is used with the valve body and valve element which were cutting short first the rod of the structure of the piston shown in drawing 3 , and a rod, and were shown in drawing 1 , the directional control valve of the example of drawing 1 can be built. A female screw is formed in the inner circumference for a narrow diameter portion 281 of the through hole 28 of covering partial 20c of the structure shown in drawing 1 , the flow control member 8 is screwed there, and if the

point for a narrow diameter portion 46 of a rod (part projected above the flow control member by drawing 3) is cut off among the structures of the piston shown in drawing 3 , and a rod, the directional control valve of the example of drawing 2 can be built. Moreover, in the above, if a rod 43 is used while it has been long as shown in drawing 3 , the directional control valve of the example of drawing 3 can be built. Furthermore, if a rod is used cutting it from what is shown in drawing 1 still shorter, as shown in drawing 4 , the drawing adjustment function at the time of clausilium can also be built to mere directional-control-valve 1''' which does not have the flow adjustability at the time of valve opening, either.

[0020]

In addition, in the above-mentioned example, although it has structure which formed the piston, the valve rod, and the rod in one, they may be manufactured separately and you may fix mutually.

[0021]

[Effect of the Device]

According to this design, it is possible to do the following effectiveness so.

(b) The directional control valve which can view the operating state of a valve from the outside can be manufactured.

(b) Since what is necessary is just to attach a microswitch etc. in the exterior of a valve body even when returning and displaying the operating state of a valve on an electrical signal, it can change simply and cheaply.

(c) Structure is easy and can manufacture a compact directional control valve.

(d) Only by processing some components, the directional control valve which does not have at all the directional control valve which has a drawing function at the time of clausilium, the directional control valve which has the flow adjustability at the time of valve opening, the directional control valve which has both functions, or both functions can be manufactured, and reduction of a manufacturing cost can be aimed at.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application]
This design is further related with the directional control valve which has at least one of the function to permit the stagnation prevention style at the time of clausilium in a detail, and the flow adjustability at the time of valve opening about a directional control valve.
[0002]

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PRIOR ART

[Description of the Prior Art]
Even when it is in a closing location, there are some the valve element is indicated to be, for example to JP,3-25087,U as a conventional thing of the directional control valve of a format which is slightly separated from the valve seat and permits slight flow in passage. One conventional directional control valve shown in this official report As shown in drawing 5 , the engagement hole e is formed in the piston d connected with the valve element c arranged in the valve body b of a directional control valve a. Attach strangely good [a location] in the upper part of the valve body b diaphragm adjusting-screw h by which the stopper g which enters in the engagement hole e was formed at the tip in one, and it enables it for a stopper to restrict migration of a valve element. The location of a stopper is adjusted, and he forms few clearances among them, without a valve element contacting a valve seat i by it at the time of clausilium, and is trying to permit the flow of a fluid by adjusting the location of the drawing adjusting-screw h. Moreover, other directional control valves indicated by this official report As shown in drawing 6 , arrange bell shape another drawing flow control **** j on the outside of diaphragm adjusting-screw h, and enable justification of the flow control **** j about the valve body c, and justification of diaphragm adjusting-screw h is enabled about the flow control **** j. At the time of valve opening, Piston d is made to contact the inner edge of the flow control **** j, and the opening at the time of valve opening is adjusted.
[0003]
However, in any case, in the above conventional directional control valves, there is a fault which cannot view the operating state of a valve element from the outside. If it is going to enable it to observe the operating state of a valve element from the outside by such control valve, while embedding a magnet at a piston, a piston must be adjoined, and a field indicator must be formed in a valve body, and it also has the fault to which a control valve becomes expensive. Moreover, since the configuration of a piston and a diaphragm adjusting screw and structure become complicated, the fault which becomes expensive also has the conversion cost of a control valve.
[0004]

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EFFECT OF THE INVENTION

[Effect of the Device]
According to this design, it is possible to do the following effectiveness so.
(b) The directional control valve which can view the operating state of a valve from the outside can be manufactured.
(b) Since what is necessary is just to attach a microswitch etc. in the exterior of a valve body even when returning and displaying the operating state of a valve on an electrical signal, it can change simply and cheaply.
(c) Structure is easy and can manufacture a compact directional control valve.
(d) Only by processing some components, the directional control valve which does not have at all the directional control valve which has a drawing function at the time of clausilium, the directional control valve which has the flow adjustability at the time of valve opening, the directional control valve which has both functions, or both functions can be manufactured, and reduction of a manufacturing cost can be aimed at.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]
The technical problem which this design tends to solve is offering the cheap directional control valve which can be changed easily [structure is easy and / the structure of it being made to a compact, and being able to view the operating state of a valve element from the outside, or detecting the operating state of a valve element electrically].
[0005]

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MEANS

[Means for Solving the Problem]
The valve body which has the valve port to which one design of this application opens between two or more ports and this port for free passage, It has the piston arranged movable in the cylinder which was connected with the valve element arranged possible [closing motion of this valve port] in this valve body, and this valve element, and was prepared in this valve body. In the directional control valve which operates this valve element by operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. It attaches in this rod possible [justification of the diaphragm controller material which restricts migration in the direction of clausilium of this valve element in contact with this covering part], and is constituted.
The valve body which has the valve port to which other designs of this application open between two or more ports and this port for free passage, It has the piston arranged movable in the cylinder which was connected with the valve element arranged possible [closing motion of this valve port] in this valve body, and this valve element, and was prepared in this valve body. In the directional control valve which operates this valve element by operating this piston Attach in this piston the rod extended to shaft orientations toward a direction opposite to this valve element, and this rod is made to project to the exterior of this valve body through the hole formed in the covering part of this valve body. the flow control member of the hollow which restricts migration of the valve element of the valve-opening direction to this hole of this covering part in contact with this rod -- this valve body -- being related -- justification -- possible -- attaching -- this rod -- this -- it is made to penetrate in the 2nd controller material, and is constituted.
In addition, you may attach in this rod possible [justification of the diaphragm adjusting screw which restricts migration in the direction of clausilium of this valve element in contact with a flow control member].
[0006]

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OPERATION

[Function] the time of hydrostatic pressure not acting on the field by the side of the valve element of a piston in the above-mentioned configuration -- a piston -- an operation of a spring -- or it is pushed on a valve element side by the hydrostatic pressure which acts on the opposite side of a piston, and a valve element is pressed by the clausilium condition. In the flow control member which was attached in the rod attached in the piston at this time and which it extracted, and controller material hit the valve body, or was attached in the valve body, migration in the direction of clausilium is restricted, a valve element is made by the clearance between a valve element and a valve seat, and a fluid flows slightly between ports. On the other hand, if a fluid acts on the field by the side of the valve element of a piston, a piston and a valve element move in the direction, i.e., valve-opening direction, which separates from a valve seat, and a directional control valve will be in a valve-opening condition. In this case, if the flow control member is attached in the valve body, in contact with that flow control member, the opening of a valve element will be restricted for a rod, and the flow rate at the time of valve opening will be adjusted.
[0007]

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EXAMPLE

[Example] Hereafter, the example of this valve is explained to this hole of - part with reference to a drawing.
In drawing 1 , this **** control valve 1 is shown in the 1st amount controller material. A directional control valve 1 is made to penetrate in a ready member in this drawing. It has the valve body 2 which part 20b Reaches and has a part for the upper part, i.e., covering partial 20c, the valve element 3 arranged in this valve body 2, and the driving gear 4 which drives a valve element 3. The above-mentioned valve bodies 20a, 20b, and 20c are being fixed to the base 10 by the well-known approach. The valve seat 24 surrounding the upper limit (setting to drawing 1) of the valve port 23 which connects the inlet-port port 21, an exit port 22, an inlet-port port, and an exit port, and a valve port is formed in lower part 20a of the valve body 2. Fitting immobilization of the central partial 20b of the valve body 2 is carried out on lower part 20a, and the through hole 25, the cylinder hole 26, and the feeding-and-discarding port 27 that leads to a cylinder hole are formed. The through hole 28 and the feeding-and-discarding port 29 are formed in covering partial 2c of the valve body 2. The through hole 28 consists of parts for a part for the inside major diameter 281, and the outside narrow diameter portion 282. Each parts 20a, 20b, and 20c of the above-mentioned valve body 2 are preferably formed by the resin ingredient of corrosion resistance, for example, Teflon, (brand name).
[0008]
The valve element 3 has the fixed part 33 formed in the periphery of the valve portion 31 which engages with the valve seat 24 formed in the valve body, and a valve portion 31 at the periphery of the valve portion 31, the thin diaphram part 32 formed at one, and its diaphram part 32, and they are formed in one with the resin ingredient which is supple with corrosion resistance. A fixed part 33 is pinched and fixed between lower part 20a of a valve body, and central partial 20b, and the fluid in each ports 21 and 22 for the lower part and a valve port 23 flows in central partial 20b.
[0009]
The valve rod 42 which the driving gear 4 was equipped with the piston 41 with which it was equipped movable in this example in the cylinder hole 26 of central partial 20b of the valve body 2, and penetrated the inside of the through hole 25 of central partial 20b to one of that piston side (it is the bottom at drawing 1), and was fixed to the valve portion 31 bottom of a valve element 3 is formed in one. The tip of a valve rod (being drawing 1 lower limit)
It is screwed in the tapped hole 35 formed in the top face of the valve portion 31 of ****** 3, and is being fixed to the valve element by it. The rod 43 extended to the exterior of a covering part through the through hole 28 for the upper part (i.e., covering partial 20c) is formed in the another side side of a piston 41 in one. A part for a part for the major diameter 45 included in a part for the major diameter 281 of a through hole 28 and the narrow diameter portion 46 included in a part for the narrow diameter portion 282 of a through hole 28 is formed in the rod 43. The O ring seals 51, 52, and 53 are arranged in the periphery of a piston 41, the periphery

of a valve rod 42, and the periphery of a rod 43, respectively, and the leakage of the fluid between a valve rod and a through hole and between a rod and a through hole is prevented between a piston and a cylinder hole. A spring 6 is arranged between a piston 41 and covering partial 20c, and the piston is always oppressed to the valve element 3 side.
[0010]
A male screw 47 is formed in the periphery by the side of the tip for the narrow diameter portion 46 of a rod 43 (it sets to drawing 1 and is upper limit), it extracts to the male screw, and the controller material 7 is screwed. This drawing controller material consists of nuts 71 and 72 of a pair, and it can be fixed to a rod while it is movable possible [justification] about a rod 43 by the well-known approach.
[0011]
In the directional control valve 1 of the above-mentioned configuration, when hydrostatic pressure is not supplied to the feeding-and-discarding port 27, the piston 41 is oppressed according to an operation of a spring 6 at the lower part 3, i.e., valve element, side. In this case, if it is made for the inferior surface of tongue of a nut 71 to contact the top face of covering partial 20c before turning the diaphragm controller material 71 and 72, i.e., nuts, making it move about a rod 43 and the inferior surface of tongue of the valve portion 31 of a valve element 3 contacting a valve seat 24, also in the time of clausilium, few clearances are formed between a valve element 3 and a valve seat 24, and a fluid (stagnation prevention style) can flow slightly to the method exit port 22 of inlet-port port 21. And the flow rate to which the fluid at the time of clausilium flows can be changed by extracting about a rod and changing the location of the nuts 71 and 72 of the controller material 7. In addition, hydrostatic pressure may be made to act on deflecting a piston 41 and a valve element 3 in a clausilium location at the piston bottom not only through the thrust of a spring 6 but through the feeding-and-discarding port 29.
[0012]
On the other hand, if the hydrostatic pressure more than a predetermined pressure (the minimum pressure which resists a spring and pushes up a piston) is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a directional control valve will be in a valve-opening condition. In this case, since actuation of a piston was interlocked with, the rod 43 moved and that rod has projected on the outside of a valve body, actuation of a piston, therefore a valve element can be viewed from the outside.
[0013]
In drawing 2 , other example 1' of the directional control valve of this design is shown. In addition, in this example, the reference number same about the example of drawing 1 and common components is attached, and explanation is omitted.
The point that directional-control-valve 1' differs from a directional control valve 1 is as follows. That is, the path of through hole 28' by which covering partial 20c' formation of the valve body 2 was done is large as compared with the through hole 28, and the female screw 283 is formed in inner circumference. And in the through hole 28', the part 81 of the shape of hollow tubing by which the male screw 82 was formed in the periphery of the flow control member 8 is screwed. The lock nut 84 screwed in a male screw 83 and it can adjust now this flow control member 8 in the location of arbitration about covering member 20c by the well-known approach. It lets a part for the narrow diameter portion 46 of a rod 43 pass in the flow control part 8. The inside edge (it is a lower limit at drawing 2) of this flow control member 8 can restrict migration to above [of a piston] now in contact with a piston 41 and the shoulder 48 of the rod 43 formed in one.
[0014]
the time of hydrostatic pressure not being supplied to the feeding-and-discarding port 27 in

directional-control-valve 1' of the above-mentioned example -- a piston 41 -- the thrust of a spring 6 -- or it was oppressed at the lower part 3, i.e., valve element, side according to the thrust of the spring, and the force of the fluid supplied to the piston 41 bottom from the supply port 29, and the inferior surface of tongue of the valve portion 31 of a valve element 3 has stopped in contact with a valve seat 24. Therefore, a valve port 23 is shut by the valve element 3, and a directional control valve is in a clausilium condition. In this example, since a clearance is not formed between a valve element and a valve seat in a clausilium condition, it does not have the function to pour a fluid from an inlet-port port slightly to an exit port.

[0015]

On the other hand, if the hydrostatic pressure of a predetermined pressure is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a directional control valve will be in a valve-opening condition. In this case, if a piston 41 and a rod 43 carry out predetermined distance migration, the shoulder 48 of a rod 43 will restrict above migration of a valve element 3 for above migration of a piston and a rod by this in the lower limit of the flow control member 8. Therefore, by adjusting the location of the flow control member 8 about covering partial 20c', the maximum climb location of a piston, therefore the distance of the valve element 3 from a valve seat 24 can be adjusted, and the flow rate at the time of valve opening of a directional control valve can be adjusted. Moreover, since actuation of a piston was interlocked with, the rod 43 moved and the rod has projected on the outside of a valve body, actuation of a piston, therefore a valve element can be viewed from the outside.

[0016]

In drawing 3 , other example 1" of the directional control valve of this design is shown. In addition, in this example, the reference number same about the example of drawing 2 and common components is attached, and explanation is omitted.

The point that directional-control-valve 1" differs from directional-control-valve 1' is as follows. Namely, narrow diameter portion part 46of rod 43" which it lets pass in flow control member 8" is quite longer than a part for the narrow diameter portion 46 of the directional control valve shown in drawing 2 . The nuts 71 and 72 of the pair which constitutes the same drawing controller material 7 as the case of drawing 1 are screwed in the male screw 47 with which the upper limit was formed outside at a projection and its projected part exceeding the upper limit of the flow control part 8.

[0017]

the time of hydrostatic pressure not being supplied to the feeding-and-discarding port 27 in directional-control-valve 1" of the above-mentioned configuration -- a piston 41 -- the thrust of a spring 6 -- or it is oppressed at the lower part, i.e., valve element, side according to the force of the fluid supplied to the piston 41 bottom through the thrust and the feeding-and-discarding port 29 of the spring. In this case, if it is made for the inferior surface of tongue of a nut 71 to contact the top face of the flow control member 8 before turning the diaphragm controller material 71 and 72, i.e., nuts, making it move about rod 43" and the inferior surface of tongue of the valve portion 31 of a valve element 3 contacting a valve seat 24 Also in the time of clausilium, few clearances are formed between a valve element 3 and a valve seat 24, and a fluid (stagnation prevention style) can flow slightly to the method exit port 22 of inlet-port port 21.

And the flow rate to which the fluid at the time of clausilium flows can be changed by extracting about a rod and changing the location of the nuts 71 and 72 of the controller material 7.

[0018]

On the other hand, if the hydrostatic pressure of a predetermined pressure is made to act on the piston 41 bottom through the feeding-and-discarding port 27, the valve element 3 connected with a piston 41 and its piston resists the thrust of a spring 6, it moves up, and a

directional control valve will be in a valve-opening condition. In this case, if a piston 41 and a rod 43 carry out predetermined distance migration, the shoulder 48 of a rod 43 will restrict above migration of a valve element 3 for above migration of a piston and a rod by this in the lower limit of the flow control member 8. Therefore, by adjusting the location of the flow control member 8 about covering partial 20c', the maximum climb location of a piston, therefore the distance of the valve element 3 from a valve seat 24 can be adjusted, and the flow rate at the time of valve opening of a directional control valve can be adjusted.
[0019]
according to this design, a piston 41 and the rod 43 of it and one are shown in drawing 3 -- having -- structure [like] (structure where the amount of [of a rod] narrow diameter portion is the longest) -- and if it manufactures beforehand in structure as shown in drawing 1 , a part for the upper part, i.e., covering partial 20c, of the valve body 2, it can change into the three above-mentioned examples only by performing slight processing to those components at the directional control valve of the structure shown further at drawing 4 . That is, if it is used with the valve body and valve element which were cutting short first the rod of the structure of the piston shown in drawing 3 , and a rod, and were shown in drawing 1 , the directional control valve of the example of drawing 1 can be built. A female screw is formed in the inner circumference for a narrow diameter portion 281 of the through hole 28 of covering partial 20c of the structure shown in drawing 1 , the flow control member 8 is screwed there, and if the point for a narrow diameter portion 46 of a rod (part projected above the flow control member by drawing 3) is cut off among the structures of the piston shown in drawing 3 , and a rod, the directional control valve of the example of drawing 2 can be built. Moreover, in the above, if a rod 43 is used while it has been long as shown in drawing 3 , the directional control valve of the example of drawing 3 can be built. Furthermore, if a rod is used cutting it from what is shown in drawing 1 still shorter, as shown in drawing 4 , the drawing adjustment function at the time of clausilium can also be built to mere directional-control-valve 1''' which does not have the flow adjustability at the time of valve opening, either.
[0020]
In addition, in the above-mentioned example, although it has structure which formed the piston, the valve rod, and the rod in one, they may be manufactured separately and you may fix mutually.
[0021]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view of one example of the directional control valve of this design.
[Drawing 2] It is the sectional view of other examples of the directional control valve of this design.
[Drawing 3] It is the sectional view of another example of the directional control valve of this design.
[Drawing 4] It is the sectional view of the modification of a directional control valve.
[Drawing 5] It is the sectional view of an example of the conventional directional control valve.
[Drawing 6] It is the sectional view of an example of the conventional directional control valve.
[Description of Notations]
1, 1', 1" Directional control valve
2 Valve Body
20a, 20b, 20c Part 21 22 Port
23 Valve Port 24 Valve Seat
26 Cylinder Hole 28 Through Hole
3 Valve Element
31 Valve Portion 32 Diaphram
4 Driving Gear
41 Piston 42 Valve Rod
43 Rod
7 Drawing Controller Material
8 Flow Control Member

[Translation done.]